SANTA CLARA COUNTY FLOOD CONTROL

AND

WATER DISTRICT

REPORT

ON

PROPOSED IMPROVEMENTS

ON

ALAMITOS, CALERO AND SANTA TERESA CREEKS

INCLUDING MINOR IMPROVEMENTS TO

GREYSTONE AND RANDOL CREEKS

ZONE C-1 (CENTRAL)

Project Number 30010 (Alamitos Creek)
Project Number 30012 (Calero Creek)
Project Number 30027 (Santa Teresa Creek)

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FEBRUARY 1973

ZONE C-1 (CENTRAL)

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INTRODUCTION

Alamitos Creek, Calero Creek and Santa Teresa Creek are located in the Central Zone of the Santa Clara County Flood Control and Water District, with the major portions in the unincorporated territory and the balance in the City of San Jose.

Alamitos Creek originates in the Santa Cruz Mountains south of the City of San Jose at elevation 3,800 feet. It flows in a north-northwest direction to Almaden Reservoir, then in a north-northeast direction until it passes through the community of New Almaden and then in a north-northwest direction to the point of confluence with Guadalupe Creek where the resultant stream becomes known as Guadalupe River.

Calero Creek originates in the Santa Cruz Mountains south of the City of San Jose at elevation 1,600 feet. It flows in a north-northeast direction to Calero Reservoir and then in a north-northwest direction to its confluence with Alamitos Creek.

Santa Teresa Creek originates in the Santa Teresa Hills at elevation 1,080 feet. It flows in a south-southwest direction until well into the valley floor and then in a north-northwest direction to its confluence with Calero Creek.

The Planning Departments of the City of San Jose and Santa Clara County have prepared conceptual plans of linear

park chains for Alamitos and Calero Creeks during recent years. These plans have been considered in developing the flood control requirements for the creeks described in this report. A number of meetings were held with different groups of property owners or concerned citizens in the project area. Ideas expressed at the meetings were considered in the development of the recommended plan.

Alamitos Creek, Calero Creek and the lower reaches of Santa Teresa Creek are well defined and generally have adequate flow carrying capacity for small, frequently occurring floods. However, in some areas of the upper valley floor reaches of Santa Teresa Creek, the channel is poorly defined and unable to adequately drain adjacent lands during frequent storms. The areas adjacent to all three channels have experienced flooding in the past during moderate to high runoff events. Further development along the streams will increase the potential flood hazard and flood control improvements should be provided to prevent damages.

Alternative types and combinations of improvements have been studied to develop the most desirable and economical solution. This report presents the results of these studies and consists of:

1. A general description of the watershed and flood problems together with a map showing the location of the proposed improvements.

2. A discussion of the proposed project and major alternatives together with plates showing plans, profiles and rights-

of-way of the proposed project.

3. An estimated cost of the proposed project and a suggested means of financing these costs.

DESCRIPTION OF WATERSHED

Alamitos Creek, Calero Creek, and Santa Teresa Creek watershed boundaries are shown on Plate 2, a general map of the area.

Alamitos Creek flows in a well defined, aesthetically appealing channel from its origin in the Santa Cruz Mountains to its confluence with Guadalupe Creek. The total watershed area of Alamitos Creek is 37.8 square miles of which 11.7 square miles are located in the mountainous regions above Almaden Dam (a water conservation facility creating a reservoir of 1,790 acre-feet capacity) and 13.6 square miles are located in the lower foothills and on the floor of the Almaden Valley. The remaining 12.5 square miles of the Alamitos Creek watershed constitute the Calero and Santa Teresa Creek watersheds.

Below Almaden Reservoir to the confluence with Calero Creek, the Alamitos Creek channel flows through a steep to moderately steep reach which has a well defined low flow channel. There is limited residential development along the creek with the heaviest concentration just below Almaden Dam. Adjacent areas in the downstream sections of this reach would be flooded at high flood flows.

From the confluence with Calero Creek to the confluence with Guadalupe Creek, Alamitos Creek flows through a moderately

sloping reach and has a well defined low flow channel. This channel contains moderate to relatively abrupt meanders. Adjacent westerly and southwesterly lands contain low to medium density residential and commercial development. Adjacent easterly and northeasterly lands are predominantly agriculture with very low residential density. Golf Creek, Greystone Creek and Randol Creek (previously completed flood control projects) outfall into Alamitos Creek in this reach. Adjacent lands along this entire reach would be flooded at high flood flows.

Calero Creek flows in a well defined aesthetically appealing channel from its origin in the Santa Cruz Mountains to its confluence with Alamitos Creek. The total watershed area of Calero Creek is 12.5 square miles of which 7.0 square miles are located in the hills above Calero Dam (a water conservation facility creating a reservoir of 10,280 acre-feet capacity) and 3.0 square miles are located in the lower foothills and on the floor of the basin's valley. The remaining 2.5 square miles of the Calero Creek watershed constitute the Santa Teresa Creek watershed.

From Calero Reservoir to about 4,000 feet along the channel downstream of Fortini Avenue, the stream flows through a moderately sloping reach with a well defined low flow channel. Present adjacent land use is agricultural with very low residential density. Minor flooding to adjacent lands would occur

during high flood flows.

From about 4,000 channel feet downstream of Fortini Avenue to the confluence with Alamitos Creek, the channel flows through a moderately sloping reach in a well defined channel generally capable of conveying design flood flows with acceptable freeboard. Adjacent land use is agricultural with very low residential density.

Santa Teresa Creek flows through a well to poorly defined channel from its origin in the Santa Teresa Hills to its confluence with Calero Creek. The total watershed area is 2.5 square miles with about 1.5 square miles located in the hills and the remaining one square mile located in the lower foothills and on the floor of the basin's valley.

From the foothills to about 3,500 feet along the channel upstream from the confluence with Calero Creek, the creek flows through a moderately sloping, well to poorly defined channel with low to very low capacity. Sediment transport and deposition generally account for the reduced capacity in these upper reaches.

The remaining 3,500 feet of channel, however, flows through a moderately sloping reach in a well defined aesthetically appealing channel generally capable of conveying the design flows with freeboard. Adjacent land use along this reach and the upper reaches is predominantly agricultural and grazing

with sparse localities of very low residential density.

The mean annual precipitation of the Alamitos Creek basin (which includes the watersheds of Golf, Greystone, Randol, Calero and Santa Teresa Creeks) varies from a high of 68 inches in the Santa Cruz Mountains above Almaden Reservoir to a low of 18 inches in the vicinity of the confluence of Alamitos Creek with Guadalupe Creek. The basin-wide average rainfall is 34.0 inches.

The upland mountainous drainage areas of Alamitos Creek, Calero Creek and Santa Teresa Creek have soils developed on sedimentary rocks, basic igneous rocks and serpentine rocks. The main soils are of the Los Gatos, Gaviota, Vallecitos and Haymen Association. They range in depth from shallow to deep and are located on steep to very steep slopes with good drainage. The vegetative cover includes grasses, oak, pine, brush and hardwood. The upland soils have been classified to have high to very high erosion potential although the sediment deposition rates in the upstream reservoirs have not been high in the past. This is probably explained by the present land use which does not disturb the native cover. The infiltration rate of water into these upland areas is classified as very slow.

The soils in the lowland valley and foothill areas are of the Arbuckle, Zamora, Pleasanton Association having a depth

varying from shallow to moderately deep. In general, the soils are the type that drain relatively well. The lowland soils are classified as having none to slight erosion potential and have a moderate water infiltration rate. Some erosion has occurred in the stream channels and banks during periods of high runoff.

Present land use in the upland and mountainous regions of the watersheds is open space (grazing, forests and brush, water and water channels) and the County "General Plan" shows only limited future development in these areas.

The Almaden General Plan, dated 1969, calls for full development of the valley floor with residential density ranging from very low to medium. The plan calls for a community center, neighborhood shopping centers, schools and parks. Some of the parks in the plan are streamside parks along Alamitos and Calero Creeks. The County Parks Department and the Flood Control District are jointly planning a major park-recreation dam-reservoir complex at the present site of Calero Reservoir.

The combined effect of these watershed characteristics (soil type, urban and upland development, existing and potential reservoir storage), together with the hydrology of the area, has been considered in developing the proposed flood control improvements described in this report.

DESIGN CRITERIA

The criteria used in the design of flood control improvements on Alamitos, Calero and Santa Teresa Creeks and their tributaries follow accepted engineering standards. Conservative values of the roughness coefficient (representing the friction along the channel banks and bottom) were used in hydraulic design of the channels to allow for some deterioration in channel smoothness with time.

Alternative improvements were compared on an economic basis with due consideration for aesthetics. Estimated construction costs including engineering and inspection costs, right-of-way values and the present worth of future maintenance costs, were inputs into the comparison analysis.

Completed improvements will provide a level of protection to safely convey the one percent flood (the so-called 100-year recurrence interval flood) through the area. Design flows were computed using the results of a regional flood frequency hydrologic analysis. The multiple correlation analysis, based on recorded data from gaged watersheds, is utilized to determine at a given point the required flood flow values in accordance with tributary area, mean annual precipitation and basin shape. The final selected design flow values also take into account the incidental effects of the existing and future water

conservation reservoirs in the basin. The effects of existing and future urbanization on the runoff were estimated and the resulting design flood flows are given in Table 1.

TABLE 1

PEAK FLOWS FOR DESIGN FLOODS

Reach	Station	Watershed Area (Sq. Miles)	Design Discharge (cfs)
1-5	0+00 to 42+30	37.8	7,600
6-15	42+30 to 139+00	33.5	7,500
16-18	139+00 to 176+00	28.5	7,300
19-31	176+00 to 330+00	16.0	5,400
Greystone Creek			
1-3	0+00 to 9+00	1.4	600
Randol Creek			
1	0+00 to 15+50	2.2	680
Calero Creek			
1-5	0+00 to 35+20	12.5	1,900
6-16	35+20 to 196+00	9.3	1,000
Santa Teresa Creek			
1-6	0+00 to 74+30	2.5	1,100
7-11	74+30 to 100+30	1.4	715
Southeast Branch Santa Teresa Creek			
1-3	0+00 to 27+85	0.6	250

DESCRIPTION OF PROPOSED PROJECT

Preliminary studies for this project included analyses of various flood control alternatives considering hydraulic criteria, hydrology, economics, soil characteristics, existing terrain, present and projected land use, reservoir storage, ecology and aesthetics. In the initial refinements, the resultant acceptable alternatives based on the above considerations included possible upstream storage in existing and potential reservoirs, fully excavated trapezoidal channels with drop structures, rock lined trapezoidal channel reaches, concrete lined reaches, and modified floodplain channels which utilize existing channel conditions in conjunction with levees or floodwalls to control the flood flow width.

The final proposed improvements are presented in the order of Alamitos Creek, Tributaries with Existing Flood Control Improvements, Calero Creek, Santa Teresa Creek and its Southeast Branch, Upstream Reservoirs and Possible Upstream Work.

Alamitos Creek

Proposed improvements to Alamitos Creek extend for 33,000 feet from the confluence with Guadalupe Creek to Bertram Road bridge immediately downstream of the community of New Almaden. The proposed improvements consist of trapezoidal

earth channel with levees, two energy dissipators, a gabion lined channel and modified floodplain channels, natural channels with levees and floodplain channels, natural channels without levees. The proposed improvements are illustrated on Plates 3 through 15.

The proposed flood control right of way shown on the plates is the minimum right of way required to provide flood control protection for the selected alternative which in some cases includes levees. In certain reaches the levees are relatively low and could be deleted if shallow flooding of the adjacent lands was permissable. Where this possibility exists it is shown on the plans by a dashed line delineating the limit of flooding under the design flood. However, the levees are less costly than the additional right of way and the extra width cannot be justified from a flood control standpoint alone.

It should be noted that levees, while serving to confine flood waters within the watercourse, make it more difficult to get local runoff into the channel. Drainage inlets through the levees are required at an average of four per levee mile and their costs are included in the project estimate.

Reaches 1 to 3 of this project as shown on Plate 3 consist of trapezoidal earth channel. The channel cross section was determined by considering the requirements to pass the design flow, to control erosive velocities and to conform with Guadalupe Creek at the confluence. Reaches 1 and 2 can optionally be left

in semi-natural state to be used as a general flood plain area and developed as a portion of the Almaden Lake Park, a segment of the Alamitos Creek Park Chain under design by the City of San Jose.

Reaches 3 through 5 shown on Plates 3 and 4 include minor modifications to the natural channel and flood plain to provide a flood water surface which is compatible with Golf Creek at its confluence with Alamitos Creek. If the fully natural channel were utilized in conjunction with levees in these reaches the design water surface would be higher at the Golf Creek-Alamitos Creek confluence causing backwater conditions in Golf Creek. This would necessitate levees for about 3,100 feet along Golf Creek. Local drainage conditions in the lower Golf Creek reaches, however, cannot tolerate levees or flood water surface elevations above the elevations of existing ground. Hence, the flood water surface elevation in Alamitos Creek was lowered to be compatible with local drainage requirements. Modifications to the natural channel in these reaches include minor excavation, rock lining and a grouted rock drop structure located immediately upstream of the Alamitos Creek-Golf Creek confluence.

Beginning with Plate 4, reaches 6 and 7, the existing channel will be maintained in its natural state and a diversion channel will be excavated northeasterly of the existing channel. The design water surface will be below the existing ground and no levees will be needed in this area.

In reach 8 (Station 55+00 to Station 80+00), shown on Plates 5 and 6, the left bank looking downstream is immediately adjacent to a medium density residential area which has constricted the land available for flood flows and a gabion lined excavated channel will be required. The channel will be located so as to remove as few of the existing large trees as possible.

In reaches 9 and 10, the existing channel will be enlarged and deepened. Side slopes will be kept at 4:1 through most of the reach. Where it is possible to save existing large trees, the side slopes can be steepened immediately adjacent to the trees or some type of rock protection provided around the trees. The Greystone Creek-Alamitos Creek confluence occurs at Station 95+00. In order to match the channel bottom elevation of Alamitos Creek, the Greystone Creek channel will have to be lowered about 5 feet. Details on the Greystone Creek improvements are discussed on page 21 of this report.

Existing channel alignment and minimum necessary right-of-way width in reaches 11, 12 and 14 will require the eventual purchase and removal of three existing dwellings. Purchase costs are included in the right-of-way estimate for these reaches.

Greystone Lane crosses the channel at Station 117+50 (reach 13) and, in its present state, would cause backwater conditions and additional flooding to occur upstream. To prevent these conditions, the existing crossing will be removed and

replaced with a bridge having a minimum number of spans crossing the full width of the proposed flood control right of way. The District will pay the cost of lengthening the bridge and replacing the existing roadway in conformance with modern standards. The pier configuration and location would be designed to cause no undesirable backwater conditions.

High flows in reach 14 would cause the existing Greystone Lane to be inundated. The road should therefore be raised to the minimum levee elevation for this reach as shown on Plate 7 to provide safe access at all times.

The left bank levee (looking downstream) in reaches 17 and 19 shown on Plates 9 and 10 is adjacent to the existing and proposed Camden Avenue alignment. In these reaches where Camden Avenue is yet to be installed, the road can be constructed to the design levee elevation and the adjacent levee in these areas deleted allowing high flows to spread to the roadway embankment.

The Randol Creek-Alamitos Creek confluence occurs at Station 139+00. The high water surface in Alamitos Creek will require changes on Randol Creek since Randol Creek was originally designed considering Alamitos Creek as an excavated channel with a water surface below the existing ground. See page 22 of this report for details on Randol Creek.

In reach 17, the right bank levee (looking downstream) is isolated and requires obtaining access over adjacent private lands as shown on Plate 9. The levee, however, may be deleted

if the additional flooding right-of-way can be obtained as previously discussed.

The Calero Creek-Alamitos Creek confluence occurs at Station 176+00. Calero Creek is currently unimproved and proposed flood control improvements on this creek are included as a portion of this report. This confluence area is particularly aesthetically pleasing and could be a focal point for joint park and flood control development.

Proposed Camden Avenue crosses Alamitos Creek at Station 188+00 (reach 20). The bridge at this crossing should have a minimum number of spans crossing the full width of the proposed flood control right-of-way. The pier configuration and location would be designed to cause no undesirable backwater conditions; the minimum bridge soffit elevation is shown on the plate.

Reaches 21 and 23 consist of leveed natural channel in a 300 foot right-of-way approximately centered on the existing channel to establish relatively uniform flow conditions. A topographic shelf exists on both banks which, if the levees were to be deleted, would naturally prevent flood flows from spreading over too great an area. These levees can be deleted only if the proposed Camden Avenue and Almaden Expressway and the existing McKean and Harry Roads are raised to the design levee elevation where these roads are within the limits of flooding shown on Plates 10, 11 and 12. Previous comments

concerning lands outside the proposed flood control right-of-way that would be flooded if the levees were deleted also apply here.

The proposed Almaden Expressway crosses Alamitos Creek at Station 221+85. Required crossing conditions are essentially the same as those previously stated for other crossings.

County plans indicate that McKean Road will be widened and re-aligned in the future as shown on Plate 12. The existing McKean Road bridge would be inundated during high flood flows and would cause backwater conditions with consequent upstream flooding. Therefore the District will remove the existing crossing and pay the cost of replacing the existing roadway in conformance with modern standards and the previously described crossing requirements.

In reach 25 shown on Plate 12, existing structures lie within the proposed right of way and will have to be removed since they encroach upon the flow area causing a constricted condition and corresponding erosive flow velocities. Purchase and removal costs of these structures have been included in the project estimate. Also in this reach, alternative to installing the right bank levee (looking downstream), McKean Road can be raised and the resultant roadway embankment utilized to confine flood flows. The left bank levee (looking downstream) in this reach and in reach 26 may be deleted with right of way cost allocations as previously mentioned.

The proposed flood control improvements in reaches 27 and

28 shown on Plates 12 through 14 cross a number of parcels that presently have access available only from Almaden Road with fords or low flow bridges crossing the existing channel. Since low flow bridges tend to impede the flow of water, all future crossings will have to be either fords which allow crossing only during periods of very low flow or high flow bridges spanning the 100-year flood water surface top width. The latter structures would be quite costly. Due to the undesirable characteristics of both crossing alternatives, it is recommended that a minimum width public access road branching from either McKean Road or the future extension of Fortini Avenue (or both) be constructed on the northeast side of the watercourse to provide all-weather access. Levees in these reaches may be deleted with consequences similar to those previously mentioned for levee deletions.

In reaches 29 through 31 shown on Plates 14 through 15, the channel becomes constricted and will be left in its existing state with no improvements planned. Flooding limits for the design flood have been shown to limit further development within this area. In order to maintain the natural channel stability, there should be only minor clearing of existing vegetation and no disturbance of the soil in these reaches.

Proposed Fortini Avenue crosses the channel in reach 30. In addition to previously mentioned crossing requirements, bridge

piers should be protected to prevent undermining from high flow velocities occurring in the naturally constricted upstream channel.

The project ends just downstream of Bertram Road bridge below the community of New Almaden. The New Almaden townspeople do not desire any flood control improvements and to preserve the natural floodway, a designated floodway map will be prepared for the area at a later date.

Tributaries with Existing Flood Control Improvements

Alamitos Creek presently has two previously improved tributaries (Greystone and Randol Creeks) that will require additional work to be compatible with the improvements proposed on Alamitos Creek. Randol Creek is capable of conveying design floods when flowing independently of Alamitos Creek; however, when high flood flows occur at the same time in Alamitos Creek under the floodplain concept and in the tributary, the water surface in the tributary will exceed the channel capacity. Consequently, the downstream portions of this tributary must be further improved to prevent flooding when simultaneous floods occur. It should be noted that the additional work on Randol Creek could be avoided by lowering the high flood flow water surface elevation in Alamitos Creek at the confluences. This can be accomplished by placing Alamitos Creek in a fully improved trapezoidal earth channel with drop structures. This alternative, however,

is more expensive than the modified floodplain alternative for Alamitos Creek, including the additional improvements required on the tributaries and it is not as desirable from an overall community standpoint nor required from a local drainage standpoint.

The work required on Greystone Creek is necessary to lower the channel bottom at the Alamitos confluence to the proposed Alamitos Creek channel bottom and upgrade the design standards of Greystone Creek downstream of Camden Avenue. This upgrading essentially consists of providing two maintenance roads with ditches and 2:1 channel side slopes.

The proposed improvements to the tributaries required by improvements to Alamitos Creek are shown on Plates 16 and 17 and described in the following paragraphs.

Greystone Creek

Proposed improvements for Greystone Creek are shown on Plate 16 and consist of about 400 feet of trapezoidal earth channel. Channel side slopes have been reduced and maintenance roads provided on both banks in reach 1 to comply with present hydraulic and maintenance standards. A slotted grating energy dissipator has been added to the Camden Avenue culvert in order to dissipate the energy at the culvert exit and reduce downstream erosion.

Randol Creek

Proposed channel improvements for Randol Creek are shown on Plate 17 and consist of about 1,550 feet of levee construction on both banks of the existing channel. Constricted right-of-way requires a relatively narrow maintenance road and retaining wall combination on the left bank looking downstream. As an alternative to this, the left bank levee may be constructed similar to the right bank levee and the Leland High School driveway on the right bank utilized as access.

The proposed Camden Avenue reinforced concrete box culvert will have upstream and downstream headwalls to prevent overtopping. The culvert inlet transition should extend to the top of the levees to prevent scour.

The project ends at Station 15+50 where backwater conditions are confined within the existing banks.

Calero Creek

Calero Creek, a major unimproved tributary of Alamitos Creek, begins at Alamitos Creek Station 176+00 and the proposed improvements extend about 19,600 feet upstream to McKean Road. The proposed improvements consist primarily of the maintenance of the natural channel with some small localized levees and are shown on Plates 18 through 23.

Reach 2 is located immediately upstream of Calero Creek -

Alamitos Creek confluence. Backwater conditions cause flood flows to leave the banks in this reach and a levee is required to confine the water to the vicinity of the natural channel. This levee may be deleted if the additional right-of-way requirements outlined in the Alamitos Creek section of this report are adhered to. Limits of resultant flooding due to levee deletion are shown by the dashed line on Plate 18.

The existing natural channel in reaches 3 through 8 is capable of conveying the design flood flows with freeboard providing that existing public crossings in these reaches are altered to prevent backwater conditions. The right-of-way in these reaches shown on Plates 18 through 21 is set back 22 feet from the top of high bank or 22 feet plus twice the vertical distance from the toe of the slope to the top of high bank, whichever is greater. No development should be permitted within these right-of-way limits.

Proposed Camden Avenue crosses Calero Creek in reach 4, at about Station 19+00. Since the existing natural channel at the crossing is not prohibitively wide, the new bridge should clear span the channel with a minimum bridge soffit elevation as shown on Plate 19 to prevent potentially hazardous backwater conditions. The existing natural channel cross section at the crossing should not be altered.

Santa Teresa Creek - Calero Creek confluence occurs in reach 6 at Station 35+00. Santa Teresa Creek is currently unimproved and the proposed flood control improvements for this stream are discussed later in this report.

Existing Harry Road bridge shown in reach 7 causes backwater and subsequent flooding conditions to occur upstream and will be removed. The new bridge should clear span the natural channel as shown on Plate 20.

In reaches 9 through 16, flood water surface elevations are at or above the elevation of the top of high bank. Proposed improvements in these reaches are shown on Plates 21 through 23 and consist of berms on both banks to confine flood flows within a reasonable right-of-way.

The two dwellings (shown on Plate 22) immediately upstream of Fortini Avenue within the proposed Flood Control right-of-way constrict the natural high flow watercourse and would be inundated during high flood flows. To provide the required berm, these dwellings must be relocated. Purchase costs of these improvements have been included in the right-of-way estimate for these reaches.

Alternatively for reaches 9 through 16, the levees may be deleted if the previously mentioned additional right-of-way cost allocations to functions other than flood control can be

arranged. Limits of flooding outside of the proposed minimum flood control right-of-way are shown on the plates.

Existing crossings at Fortini Avenue and Shillingsburg Road are incapable of conveying high flood flows without causing upstream flooding. Proposed improvements include removal of these existing bridges and replacement with clear span crossings as shown in reaches 10 and 12 on Plates 22 and 23.

The proposed improvements terminate immediately upstream of existing McKean Road shown on Plate 23. Project costs include removal of existing McKean Road bridge which would be overtopped at high flood flows and replacement with a clear span crossing. Should McKean Road be realigned as presently proposed, a similar type of clear span crossing would be required at the new location.

Santa Teresa Creek

Santa Teresa Creek, an unimproved tributary of Calero Creek, begins at Calero Creek Station 34+30 and proposed improvements extend about 10,030 feet upstream to the foot of the Santa Teresa Hills. The proposed improvements consist of natural channel and trapezoidal earth channel with drop structures and a debris basin as shown on Plates 24 through 27.

It should be noted that, since Santa Teresa Creek parallels Calero Creek for about 7,400 feet, the possibility of diverting the upstream portion of Santa Teresa Creek into Calero Creek and leaving the severed downstream reaches for local drainage was investigated. However, the additional construction and right-of-way costs on Calero Creek necessitated by the increased magnitude of the design flood flows plus the cost of the diversion itself proved to be more expensive than the proposed improvements described herein and shown on the plates.

The existing natural channel in reaches 1 through 3 is capable of conveying the design flows with freeboard providing that the existing crossing at Harry Road (which presently would overtop at high flood flows and cause upstream flooding) is removed and replaced with a clear span crossing as shown in reach 2 on Plate 24. The right-of-way in these reaches is set back 22 feet from top of high bank or 22 feet plus twice the vertical distance from the toe of the slope to the top of high bank, whichever is greater. No development should be permitted within these right-of-way limits.

In reaches 4 through 10 shown on Plates 25 through 27, the existing channel is inadequate and does not lend itself to flood plain or other semi-natural type improvements. The proposed improvements consist of trapezoidal earth channel with

drop structures at Stations 53+46, 72+12, and 84+05 for channel gradient control and full capacity reinforced concrete box culverts in reaches 5 and 8 to replace the existing inadequate crossings at Fortini Avenue and San Vicente Avenue (future Camden Avenue). The proposed alignment in these reaches basically follows the existing channel alignment except upstream of San Vicente Avenue where abrupt meanders occur.

Santa Teresa Creek branches at Station 74+30 with the minor branch to the southeast. The southeast branch is currently unimproved and proposed flood control improvements are discussed later in this report.

To prevent further sediment transport and deposition and to keep the downstream channel relatively free of major debris, a debris basin is proposed at Station 91+00 as shown on Plate 27. The basin is to be excavated below the existing ground to avoid the need for expensive structural embankments. The excavated material can be used for berm construction on Calero Creek.

Upstream of the debris dam the creek will be left in a natural condition with any future development being constructed at an elevation or on fill above the design flood elevation. The project ends at Station 110+50 where the channel enters the steep canyonous regions of the Santa Teresa Hills.

Southeast Branch Santa Teresa Creek

The Southeast Branch of Santa Teresa Creek begins at

Santa Teresa Creek Station 74+30 and extends about 2,785 feet upstream to the corner of San Vicente Avenue (future Camden Avenue) and Shillingsburg Road. The existing channel is a swale over most of the reach and frequent storm flows spread out over adjacent farm lands.

The proposed improvements are shown on Plate 28 and consist of trapezoidal earth channel with a debris basin just above San Vicente Avenue. The debris basin's primary purpose in this branch is to prevent further sediment transport and deposition which has reduced the existing channel capacity in the past. The basin will be constructed below ground for reasons previously stated.

The project ends at Station 27+85 where the remaining upstream channel becomes local drainage.

Upstream Reservoirs

Enlargement of existing Calero Reservoir was investigated in conjunction with providing flood control protection to Calero Creek and the lower reaches of Alamitos Creek. The proposed Calero Reservoir enlargement project basically consists of raising the main and auxiliary dams to provide increased storage capacity for water supply, recreation and fish enhancement purposes and would be financed by the District and the County and through State assistance. No modifications to

Almaden Reservoir are proposed at this time.

As discussed in the Design Criteria section of this report, the effects of existing Almaden Reservoir and the proposed future Calero Reservoir were considered in determination of design flows.

Possible Upstream Work

As the upper watershed experiences more urban development, the problems of water-borne debris and silt in the proposed channels and existing reservoirs may increase. If such problems do develop, then additional upstream debris basins should be considered. In accordance with District Ordinance 59-1, the minimum right-of-way required for proper flood protection and erosion control will be equal to the existing channel plus 15 feet of setback at the top of each bank for all unimproved natural streams. If the creek banks are steeper than a 2 horizontal to 1 vertical, the 15 feet would start at a point where a 2 horizontal to 1 vertical slope from the toe of bank intersects the natural ground.

CONSTRUCTION STAGING

Present conditions allow construction for the proposed improvements to be staged by creek in general accordance with present and projected land use. Staging limits by reach and station are shown on Table 2.

Generally, stage 1 for all projects would be to construct those improvements which are in developed areas where greater damage would occur from high flood flows than in other areas of the projects. This is a possibility because the flood plain approach does not require downstream reaches be constructed first.

Stage 2 on Alamitos Creek would be to construct the improvements in reaches that are adjacent to Camden Avenue. Stage 2 for Calero Creek would be to complete the project by constructing the required improvements in the lower reaches. Stage 2 for Santa Teresa Creek and its Southeast Branch would be to construct the upstream debris basins to prevent sediment deposition in the improved downstream channels.

Stage 3 for Alamitos Creek consists of construction of the improvements in the lightly developed reaches upstream of McKean Road. Stage 3 for Santa Teresa Creek would be to complete the project by constructing the lower reach improvements.

Stage 4 for Alamitos Creek would be to complete the project by constructing the improvements in the undeveloped reach downstream of McKean Road to Calero Creek confluence.

PROJECT COST AND FINANCING

Cost estimates based on 1972 price levels for the proposed improvements are itemized in Table 2. The contingency estimate accounts for current costs of engineering, construction inspection, advertising, legal fees and other incidentals. Right-of-way costs are based on prevailing (1972) values for land and the fair market value for any existing improvements.

The current assessed valuation of the Central Zone will provide an adequate source of funds from the current level of ad valorem taxes to finance the project by stages, as proposed herein.

TABLE 2

Estimated Cost of Projects

Reach	Stage	Station Limits	Constr. Costs	Conting. Costs	R/W Costs	Total Cost
Alamitos Creek						
1-5	1	0+00 to 42+30	$396,000	$139,000	$ 490,000	$1,025,000
6-10	1	42+30 to 100+00	477,000	167,000	207,000	851,000
11-15	2	100+00 to 139+00	208,000	73,000	460,000	741,000
16-18	2	139+00 to 176+00	70,000	25,000	315,000	410,000
19-24	4	176+00 to 230+50	233,000	82,000	418,000	733,000

TABLE 2 (Continued)

Reach	Stage	Station Limits	Constr. Costs	Conting. Costs	R/W Costs	Total Cost
25-31	3	230+50 to 330+00 (End of Project)	$101,000	$ 35,000	$ 428,000	$ 564,000
		TOTAL	$1,485,000	$521,000	$2,318,000	$4,324,000
Greystone Creek						
1	1	0+00 to 4+77	$ 30,000	$ 11,000	$ 13,000	$ 54,000
		TOTAL	$ 30,000	$ 11,000	$ 13,000	$ 54,000
Randol Creek						
1	1	0+00 to 15+50 (End of Project)	$ 41,000	$ 14,000	$ ---	$ 55,000
		TOTAL	$ 41,000	$ 14,000	$ ---	$ 55,000
Calero Creek						
1-5	2	0+00 to 35+00	$ 22,000	$ 8,000	$ 3,000	$ 33,000
6-10	1	35+00 to 125+50	181,000	63,000	90,000	334,000
11-16	1	125+50 to 196+00 (End of Project)	122,000	43,000	212,000	377,000
		TOTAL	$325,000	$114,000	$ 305,000	$ 744,000
Santa Teresa Creek						
1-3	3	0+00 to 35+00	$ 73,000	$ 26,000	$ ---	$ 99,000

TABLE 2 (Continued)

Reach	Stage	Station Limits	Constr. Costs	Conting. Costs	R/W Costs	Total Cost
4-6	1	35+00 to 74+30	$ 96,000	$ 34,000	$ 203,000	$ 333,000
7-10	1	74+30 to 91+00	62,000	22,000	109,000	193,000
11	2	91+00 to 110+50 (End of Project)	49,000	17,000	78,000	144,000
		TOTAL	$280,000	$ 99,000	$ 390,000	$ 769,000
Southeast Branch Santa Teresa Creek						
1-2	1	0+00 to 25+00	$ 37,000	$ 13,000	$ 115,000	$ 165,000
3	2	25+30 to 27+ (End of Project)	29,000	10,000	38,000	77,000
		TOTAL	$ 66,000	$ 23,000	$ 153,000	$ 242,000
TOTAL ALL PROJECTS			$2,227,000	$782,000	$3,179,000	$6,188,000

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations based on this investigation are presented:

1. Of the alternatives for flood control studied, the modified floodplain and natural channel concepts are the most desirable economic solutions and are most compatible with the proposed park chain along the creeks.

2. The recommended modified floodplain and natural channel concept can be applied to most of the reaches of Alamitos Creek, to all of the reaches of Calero Creek, and to the lower reaches of Santa Teresa Creek.

3. In reaches where the modified floodplain and natural channel concept can be applied, there should be no disturbance of existing topography or vegetation. Bridges in these reaches should cross the full width of the proposed flood control right-of-way in a minimum number of spans.

4. No flood control improvement is proposed for Alamitos Creek through the community of New Almaden and a flood map should be recorded as public warning of potential flood hazard in the area.

5. Greystone Creek and Randol Creek, previously completed flood control projects, will require additional improvements to be compatible with the proposed Alamitos Creek improvements.

6. The upper reaches of Santa Teresa Creek are inadequate and do not lend themselves to modified floodplain or other natural type improvements. The most economical and feasible

method of conveying the design flood flows in these reaches is by means of fully improved trapezoidal earth channel with drop structures and upstream debris basins to prevent sediment transport and deposition.

7. The projects can be financed within the existing zone tax structure by staging construction.

8. The area within the limits of the lines designated as proposed flood control right of way should be zoned against development by local zoning agencies.

Based on these conclusions, it is recommended that the flood control improvements proposed herein be approved and construction be started as soon as construction plans can be prepared and that the City of San Jose and the County of Santa Clara undertake appropriate zoning to preserve the natural floodplain.

Approval Recommended:

_____
John L. Richardson
Branch Engineer

Approved:

_____
Lloyd C. Fowler
Chief Engineer

Submitted

_____
William F. Carlsen
Associate Civil Engineer